

**Guidelines for the Development of  
Engineered Waste Management Plans  
for Concentrated Animal Feeding  
Operations  
(Dairies and Related Facilities)**

California Regional Water Quality Control Board  
Santa Ana Region

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ATTACHMENT B (ORDER NO. R8-2004-0055)

## **Introduction**

On August 20, 1999, the California Regional Water Quality Control Board, Santa Ana Region (Board), adopted Order No. 99-11 (NPDES No. CAG018001), General Waste Discharge Requirements for Concentrated Animal Feeding Operations (Dairies and Related Facilities) in the Santa Ana Region. This order required all operators of dairies and related facilities (i.e., heifer ranches and calf nurseries) authorized to discharge wastes under Order No. 99-11 to develop and implement an engineered waste management plan (EWMP). The primary purpose of an EWMP is to provide a wastewater management system that is designed, constructed, operated and maintained to comply with the wastewater containment requirements in Order No. 99-11. Order No. 99-11 includes applicable state and federal regulations that address waste discharges from animal feeding operations.

## **Background**

The Board began issuing waste discharge requirements to all animal feeding operations in the Region in 1972. These waste discharge requirements stated that each facility had to contain, on the property, all wastewater (i.e., dairy wash water, storm water runoff from manured areas, etc.), including the storm water runoff from a 24-hour, 25-year storm. In an attempt to comply with this requirement, many facilities constructed new ponds, enlarged existing ponds, constructed berms, and implemented other measures. However, these measures were generally implemented in a piecemeal fashion, usually on an as-needed basis, and often did not integrate well with other wastewater containment measures at the facility. It became more and more apparent that many of the wastewater containment improvements that were being made were not very effective. For example, ponds were not sized properly, and, therefore, did not have sufficient capacity to contain the entire volume of wastewater generated at the site; berms were sized and constructed improperly, resulting in failures; wastewater pumps, pipelines, etc., were often inoperable and were not replaced when needed; and most wastewater containment structures and equipment were often in a state of disrepair. All of these situations resulted in frequent discharges of wastewater to surface waters, primarily during the winter.

To minimize discharges to surface waters, it became apparent that an overall plan for containing wastewater was necessary. In the late 1980's, Board staff prepared a two-page document that provided guidelines for preparing an EWMP. An EWMP was then generally requested from animal feeding operations that had a history of recurring wastewater discharges. In 1994, the Board adopted Order No. 94-7 (NPDES No. CAG018001), General Waste Discharge Requirements for Concentrated Animal Feeding Operations (CAFOs). Order No. 94-7 required that, in addition to an EWMP being required from CAFOs that had a history of recurring wastewater discharges, EWMPs were to be prepared by anyone initiating a new CAFO at either a new or existing facility. The guidelines for preparing an EWMP were then included as an attachment to Order No.

94-7. Order No. 94-7 expired in March 1999, and the Board adopted Order No. 99-11 in August 1999. To assure that every CAFO had a wastewater management system capable of complying with wastewater containment requirements, Order No. 99-11 required that all CAFO operators develop and fully implement an EWMP. The existing guidelines for preparing an EWMP were included as an attachment to Order No. 99-11. However, the existing EWMP guidelines were outdated, general in nature, and did not contain sufficient criteria to comply with the wastewater containment requirements in Order No. 99-11. Therefore, Order No. 99-11 authorized the Executive Officer to make necessary revisions to the guidelines.

These revised guidelines are longer than the previous guidelines. This is primarily the result of adding explanations and clarification to make EWMPs prepared in accordance with the guidelines as consistent as possible. There are two significant differences between these guidelines and the previous guidelines. First, the new guidelines outline criteria for determining the storage capacity necessary to comply with waste discharge requirements. These criteria will result in the need for significantly more storage capacity than the criteria included in the previous guidelines. However, this does not reflect a change in state or federal regulations. Instead, previous guidelines did not accurately specify criteria for determining the storage capacity necessary to comply with state and federal regulations. Regardless of what was included in previous guidelines, CAFOs have always been, and still are, required to comply with all applicable state and federal regulations. Second, the new guidelines identify several items (such as best management practices) that should be considered in the development and implementation of EWMPs. Many of these items have been included in EWMPs approved by the Executive Officer in the past.

### **Purpose**

The purpose of an EWMP is to provide a wastewater management system that is designed, constructed, operated and maintained to comply with the wastewater containment requirements in Order No. 99-11. These guidelines do not address the management, application or disposal of manure removed from the corrals. Compliance with waste discharge requirements associated with the discharge of manure removed from corrals is addressed separately. The development and implementation of an EWMP is required by Order No. 99-11. Discharges of wastewater from a CAFO are allowed only if the CAFO operator has constructed and maintained containment structures as required, and if a chronic or catastrophic rainfall event occurs. A chronic rainfall event is a series of wet weather conditions that would total the volume of the 24-hour, 25-year storm event, and would not provide reasonable opportunity for dewatering containment structures prior to the next storm events. A catastrophic storm event includes events such as tornadoes and hurricanes, and any single event that totals the runoff volume of the 24-hour, 25-year storm event. Order No. 99-11 requires that an EWMP be developed in accordance with guidelines established by the Executive Officer. However, these are guidelines, not regulations, and any EWMP that will result in compliance with waste discharge requirements will be acceptable by the Executive Officer. Adhering to these

guidelines, though, will provide consistency for preparing EWMPs, and will increase the likelihood that the EWMP will be acceptable.

### **Elements of an EWMP**

The EWMP must be prepared by a registered engineer (civil, or other appropriate discipline) or other qualified person (required by Order No. 99-11). The qualified person preparing the EWMP must have the knowledge, technical expertise and experience appropriate to develop an EWMP. This guidance document describes five basic elements that should be addressed in an EWMP. These elements include an introduction, a design, a plot (site) plan, construction specifications, and an operation and management plan. These elements should include a detailed description, as follows:

#### **I. Introduction**

The introduction should describe the existing animal population, the design population for the EWMP, existing wastewater containment facilities, and the operation of those facilities. At a minimum, the Introduction should consist of a brief narrative that addresses the following:

- the facility address, operator name, land owner, and location of the facility with respect to cross streets or other landmarks
- the name, telephone number and address of the person responsible for implementing the EWMP on an on-going basis (CAFO operator or other designated person)
- the name, telephone number and address of the person(s) to be contacted, if necessary, in the event that the CAFO operator or designated person is not available.
- current and design animal population (for the expected life of the CAFO)
- the estimated volume of wash water generated at the facility each day (based on gallons per cow per day)
- total size of the facility (acres)
- the size (acres) of existing ponds, corrals, wastewater disposal areas and wastewater containment areas
- general location and height of berms
- how dairy wastewater is managed and where it is discharged
- storm water run-on problems (storm water that occurs off-site, but enters the CAFO), including run-on from neighboring facilities, etc.

#### **II. Design**

To comply with Order No. 99-11, containment facilities must be designed to contain all wastewater generated at the facility (i.e., dairy wash water, storm water runoff from manured areas, etc.) and all storm water runoff that comes into contact with manure generated by a 24-hour, 25-year storm. A 24-hour, 25-year storm is a 24-hour storm with

a return frequency of once every 25 years. The design must take into consideration that this storm can and should be expected to occur each year. CAFOs are required to contain the storm water runoff from all lesser storms, if that runoff has come into contact with manure.

If a CAFO does not have existing structures capable of containing the required volume of wastewater, then additional structures must be provided. This may include significantly deepening existing ponds, adding additional ponds, connecting to a sewer system, raising berms to increase the volume of wastewater that can be stored in containment areas, etc. An EWMP may be acceptable if the design has maximized the amount of wastewater that can be contained and the operation and management plan optimizes utilization of the containment capacity provided by the containment structures. **However, acceptance of such a plan will not relieve the CAFO operator of responsibility for any discharges that are not allowed by Order No. 99-11. Wastewater that is discharged off the CAFO property, even after implementing an acceptable EWMP, is still a violation of Order No. 99-11, unless the discharge occurred as a result of a chronic or catastrophic storm event.**

- Historically, containment of wash water and storm water runoff at CAFOs in the Region between the drier months of April through October has not been a problem. However, containing storm water runoff from corrals, wastewater disposal fields, etc., and daily wash water, has been problematic during the five generally wet months of November through March. During these months, evaporation is minimal, and since disposal fields are usually saturated by rainfall, percolation is minimal. Since it is difficult to dispose of daily wash water and accumulated storm water runoff during these months, wastewater facilities should be designed to contain all wastewater generated during this 150-day period, as noted below.
- Containment structures should be designed to contain 150 days of annual storm water runoff and the runoff from a 24-hour, 25-year storm. For the Chino Basin area, average rainfall for the 150 days from November through March is approximately 13 inches, and a 24-hour, 25-year storm generates approximately 4.5 inches of precipitation (based on information from the National Weather Service). For the San Jacinto area, average annual rainfall for the 150 days from November through March is approximately 11 inches, and a 24-hour, 25-year storm is approximately 3.5 inches. These are average values for these areas, and other values can be used for a particular CAFO, if justification is provided.
- Containment structures should be designed to contain 150 days of wash water. This should be based on the maximum number of milking cows for the life of the facility. Otherwise, the EWMP may have to be revised in the future, at such time that the number of milking cows exceeds the number of cows stated in the EWMP. Recent studies have shown that the average daily wash water generated at dairies in the Region is about 70 gal/cow/day (based on two milkings/cow/day). The average daily wash water produced during winter months, however, can exceed 100/gal/cow/day. The average gal/cow/day used during the winter should be used in determining the

volume of storage required for wash water. This volume can vary, depending on specific site practices, but should be about 100 gal/cow/day unless adequate justification is provided for using a smaller number. The installation of a water meter can verify the amount of water used and assist in efforts to conserve water usage, and thereby reduce the amount of water discharged to containment structures. A wash water meter will be required to justify a volume significantly less than 100 gal/cow/day.

- During the winter, evaporation is minimal. Also, ponds tend to seal up over time, and disposal fields are generally saturated during the winter, thereby minimizing percolation. In addition, the amount of wastewater percolated during the winter at a CAFO can vary, depending on the particular wastewater disposal practices implemented at that CAFO. Allowances for loss of wastewater due to percolation and evaporation can be made in determining the amount of storage required for wastewater, as long as reasonable assumptions are made that consider winter conditions and practical CAFO specific wastewater disposal practices.
- The accumulation of solids in ponds and other containment structures decreases the storage capacity available for wastewater. It is estimated that dairy wash water in the Region contains about 10% of the manure generated by a milking cow. Also, solids are present in storm water runoff from corrals, disposal land and other areas. The estimated annual decrease in available storage capacity resulting from the accumulation of these solids should be determined (the volume of manure in wash water can be considered to be 10% of what a milking cow expels).
- Calculations should be provided showing the design capacity of all wastewater containment structures (existing and proposed).
- The total capacity of the containment structures should be at least equal to the volume determined by the following equation: 150 days dairy wash water + 150 days annual storm water runoff + 24-hour, 25-year storm runoff + accumulation of solids + wastewater in containment structures on November 1 – percolation – evaporation.
- A description of all wastewater conveyance equipment and structures (pipelines, surface channels, pumps, etc.), including their design capacities, should be provided.
- CAFOs in operation prior to November 27, 1984 must be designed to protect all manured areas from inundation or washout by overflow from any stream channel during a 20-year peak stream flow (required by Order No. 99-11).
- CAFOs built after November 27, 1984 must be designed to protect all manured areas from inundation or washout by overflow from any stream channel during a 100-year peak stream flow (required by Order No. 99-11).
- The use of pumps must be considered for ponds and other containment structures so that wastewater can be pumped from ponds or containment areas to disposal areas, in

order to restore needed capacity in the containment structures. If pumps are not utilized, exceptional justification for not utilizing pumps must be included.

- Storm water containment structures must be protected against inundation from off-site stormwater sources, unless such run-on is fully contained (required by Order No. 99-11). If it is not practical to divert all storm water run-on away from a CAFO, a justification should be included that explains why it is not practical to do so. If all storm water run-on from up to a 24-hour, 25-year storm cannot be diverted from containment structures, a description of how the design takes the run-on into consideration should be included.
- The addition of roof structures in areas where manure is present, and diverting the roof runoff off site, should be considered in order to minimize the amount of precipitation that comes into contact with manure.
- Structures should be designed to prevent storm water runoff from non-manured areas (roofs, residence area, paved surfaces, etc.) from entering wastewater containment structures. The use of rain gutters and diversion trenches should be considered. If the CAFO cannot be designed to prevent or minimize the flow of this water onto containment areas, an explanation should be provided that describes how the design accounts for such flows.
- The design for ponds and other wastewater containment areas should allow vehicle access for mosquito abatement personnel to inspect and treat these areas to reduce the risk of mosquito-borne disease and to prevent insect nuisance conditions.
- An emergency spillway must be designed to provide for a controlled release of wastewater, and to maintain the integrity of existing containment structures, in the event that storm events cause the capacity of the containment structures to be exceeded. The use of gateways, valves, or other similar devices for the purpose of manually releasing wastewater, is not acceptable.
- If visual observations, hand-level measurements and information provided by the CAFO operator and others are not sufficient to determine rise and fall dimensions and flow directions for adequately calculating runoff volumes for placing and sizing appropriate containment structures, then current contours must be determined, based on acceptable engineering and surveying practices (it is expected that current contours will be necessary for most CAFOs).
- Structures should be designed to accommodate future increases in animal population.

### **III. Plot (Site) Plan**

The plot plan should be a standard blue line print, using an appropriate scale, that shows sufficient detail of all containment structures, drainage patterns, and equipment. The plot plan should include:

- The legal description of the property (i.e., parcel numbers), the primary address and any other addresses that may exist at the property, and the location of significant structures on the property (residences, milk barn, hay alleys, etc.).
- The property boundaries, the gross acreage of the property, vicinity map (insert), north arrow, legend and date the plan was prepared.
- The location, elevation contours and dimensions of all areas associated with the generation, storage or management of wastewater and manure (corrals, ponds, access roads around wastewater containment areas, wastewater disposal areas, temporary manure storage areas, cropland, etc.).
- The location of all facilities necessary for containment and management of wastewater (berms, upstream diversion structures, pumps, spillway, distribution lines, etc.) and the dimensions, elevation and cross-sections of all containment structures.
- The drainage patterns (indicated by arrows) for on-site surface drainage courses (swales, ditches, etc.) and any off-site surface drainage that can flow onto, or immediately adjacent to, the facility.

### **IV. Construction**

The construction plan should describe all construction materials, construction methods (i.e., compaction), criteria and specifications, etc., necessary for proper construction of all containment and conveyance structures (berms, ponds, levees, pipelines, channels, etc.).

- Existing berms that are not sized properly, not adequately compacted, or contain materials (i.e., manure) that are deleterious to the berm's long term stability and effectiveness, must be replaced or improved to a standard that is equivalent to that which would be expected from a new berm constructed in accordance with best engineering practices.
- Actions necessary to restore existing structures to proper conditions and capacities should be clearly described (i.e., clean out existing ponds or containment areas, regrading, repair or replacement of existing berms, etc.).



- Manure shall not be used to construct new containment structures (i.e., berms), and manure shall not be used to improve or raise existing containment structures (prohibited by Order No. 99-11).
- In accordance with acceptable engineering practices, specifications developed to assure that construction material is applied in lifts of appropriate depth, and rolled and watered to achieve a minimum compaction of 90%, must be included.

## **V. Operation and Maintenance**

An operation and maintenance plan should be provided to implement effective operation of all containment structures and equipment. During the wet season, wastewater should be managed on a daily basis to maximize the volume of containment capacity available.

- Specific procedures should be included to assure that containment structures have the maximum capacity available just prior to the wet season (November – March).
- Management practices to reduce, to the maximum extent practicable, the volume of dairy wash water generated should be addressed, particularly if the proposed structures are incapable of containing the required volume of wastewater.
- Replacement pumps should be available on-site, or advanced arrangements made for the immediate and reliable delivery of portable pumps.
- Specific procedures for operating standpipes or other conveyance systems used for applying wastewater to land should be provided to efficiently utilize the entire area available for wastewater disposal (i.e., avoid localized over-application that can occur with furrow application, and utilize methods to maximize the spreading of wastewater).
- If all storm water run-on cannot be diverted, the EWMP should contain a description of how storm water run-on will be managed or handled to minimize the impact on wastewater containment structures and to minimize the amount of wastewater that could be discharged from the CAFO.
- Specific measures to minimize the effects of gophers, squirrels or other rodents on the integrity of the containment structures should be identified.
- Removal of solids from containment structures on a scheduled basis should be specified so that the design capacity of the containment structures will be restored prior to each rain season.
- Measures for minimizing the accumulation of stagnant wastewater in low lying areas (corrals, disposal areas, etc.) and preventing potential insect nuisance conditions should be addressed.

- Weekly inspections of ponds, berms, wastewater distribution and application equipment, etc., should be specified to provide assurance that all containment structures are intact and all equipment is in proper operating condition. Daily inspections should be conducted following the first significant rain events at the beginning of the wet season (generally in early Fall), continuing through the cessation of significant rain events (generally in early Spring). Provisions for the immediate repair of any damaged containment structures (i.e., rodent holes, cracks, erosion, etc.) should be provided.
- A description of methods and schedules for maintaining disposal areas in a condition that maximizes the efficient disposal of wastewater in the winter should be provided (i.e., grading, disking, etc.).
- An equipment maintenance schedule should be provided to assure the efficient, consistent and reliable operation of all pumps, sumps, pipelines, etc.
- Weed abatement measures to maintain access to containment structures, maintain capacity of containment structures and to maintain the efficient distribution of wastewater through channels, etc., should be addressed.
- A brief emergency spill plan must be included. The plan must include a list of spare parts (pump, piping, valves, etc.) that are to be kept on site to maintain adequate wastewater containment facilities, a list of names and phone numbers for contacts for obtaining immediate emergency equipment (pump, piping, valves, heavy equipment, etc.), and a list of names and phone numbers for reporting problems (Board staff, County staff, etc.).